# MGD Game - Overview

**Military Global Distribution Game (MGD Game)**

1) **Introduction.** The Military Global Distribution Game borrows from other open-source games (specifically, the MIT Beer Game) to provide a representation of a four-tiered commodity distribution chain where each link in the system has a limited view of the entire system and must make decisions with incomplete (local) information. This version of the game was created specifically for the faculty and students of the US Army War College, but is open to other users as desired.

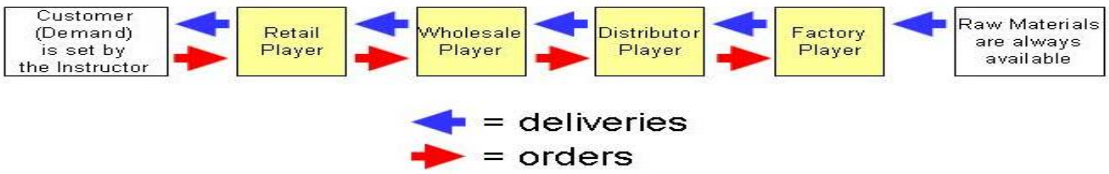
2) **Learning Objectives.** The objective of the Military Global Distribution Game is to provide USAWC students with an understanding of the impact of systems upon human behavior as discussed by Peter Senge in The *Fifth Discipline*, aiding in understanding the key elements of the concept of systems thinking. Understanding systems thinking supports the following USAWC Themes and Institutional Learning Objectives (ILOs):

   - Human Dimensions of Strategic Leadership and Strategic Vision
   - ILO 1 - Distinguish the uniqueness of strategic-level leadership and apply competencies required by strategic leaders
   - ILO 2 - Use strategic thought processes to evaluate the national security challenges and opportunities facing the United States in the 21st Century
   - ILO 7 - Synthesize critical elements, enablers, and processes that define the strategic environment in peace and war

3) **Technical Game Requirements.** There are very few hardware or software requirements to play the Military Global Distribution Game (MGD Game). The MGD Game is available on the internet at http://www.strategicleader.us and was developed using Macromedia Flash. These choices allow players to play the game, without installing any game-specific software, directly inside their internet browser. As such, the only requirements to play the game are as follows:
   a) An active internet connection
   b) One of the following Internet Browsers: Internet Explorer (version 5 or better), Mozilla, Safari, or Firefox.
   c) Macromedia Flash player (version 5 or better) installed on the computer. If Flash Player is not installed, the internet browser should prompt the user that Macromedia Flash is required, and ask if the user would like to install. Macromedia Flash must be installed for the game to work properly.
   d) Allow pop-up windows from strategicleader.us. This is because once the user logs in the game does a redirect to a new window that only contains game data. Note that the user must allow pop-ups in Internet Explorer and any other toolbars with popup blockers (such as the Google or Yahoo toolbars).

Users on government computers or who experience difficulty should see their system administrator to ensure that Macromedia Flash Player is installed and that pop-ups are allowed.

4) **Game Overview.** In this game, players manage the four components of a product distribution supply chain.




The default components in the supply chain are Retailer, Wholesaler, Distributor or Factory. The specific names can be changed during game setup by the course instructor. All four roles must be played for the game to proceed, so in the event there aren't enough people to fill all 4 roles, one player must play multiple roles, or the instructor can choose to play unfilled roles. Each players' goal is to meet its customers' demands while minimizing cost. He must try to accomplish this goal solely based upon the limited information available to him on his screen, there should be no direct communication between players of differing roles. Each component in the supply chain has unlimited storage capacity.

5) **Settings.** Each week all 4 players must process their incoming orders and then submit an order to their upstream supplier. Each player will have inventory of "the product" to use to fill incoming orders. In the event

that a player doesn't have enough inventory to fill an order, he will ship the amount available and place the remaining amount into backorder to be filled as soon as possible. The game cannot advance to the next week until all four players have taken their turn and submitted orders for the week.

6) **Delays.** There are two built in delays to the game. The first is a one week order delay. An order submitted one week is not received and processed by the upstream supplier until the next week. The second delay is a two week shipping delay. Suppliers will fill all orders as soon as possible, but there is a two week delay from the time the product is shipped until the next component receives it. The total delay then, is 3 weeks from the time an order is placed until the results of that order arrive in a players' inventory. It is worth noting that the 3 week delay is the minimum delay for all components except the factory, because this assumes that the supplier has enough inventory to meet the order as soon as he receives it. In the case of the Factory, this is always true, but for all others, their orders may be delayed greater than 3 weeks due to inventory shortages in other elements of the system.

7) **Information.** Each Player has only a limited amount of information available to him or her. This information is a snapshot of current status and the "due in" shipments two weeks in advance.


8) This picture shows a sample game screen for the wholesaler role. This screen shows the starting inventory, the incoming and outgoing shipments, the number of items in backorder, and the number of items the distributor has on backorder. Each player must process incoming orders and submit a supply order before the game can advance to the next week.

9) **Turns.** The player must do two things during each turn: Receive Incoming Orders, and Submit an order to their supplier.

i) **Incoming Orders.** The first step is to process incoming orders. To do this, the player must click the ***Process Order*** button. As soon as the player clicks this button, his screen will automatically adjust the totals to reflect the following.


(1) Items in the distributor shipping delays are advanced to the left. Items one week out are added to inventory, and items two weeks out are shown as due in next week. The number of items in the second delay box will not be shown until play advances to the next week. So from the picture above the amount of inventory will increase from 4 to 8.

(2) The new Inventory amount (original plus the amount just received - - 8 from the example above) is then used to fill the backordered items (if any) and then the incoming orders (if possible).. In the picture above there are no items on backorder, and no new orders, so the Inventory amount will remain at 8.

(3) The filled orders are immediately shipped and are shown in the first wholesaler delay box. The previous value in the first wholesaler shipping box will be moved to the second wholesaler shipping delay box. In the example above there were no orders, so the first shipping delay will go to 0 and the second shipping delay will reflect 4. Above is a picture of these changes after the player has clicked process order but before he has submitted an order to his supplier.

(4) Costs. Note the cost data in the bottom right portion of the screen. As stated in the introduction, the overall goal of the game is to minimize cost individually, as well as cost for the overall system.[i]

(5) Player costs are calculated each week after incoming orders are processed. The charges are as follows:
   (i) An inventory cost of $0.50 for each unit of on hand inventory
   (ii) An inventory cost of $0.50 for each unit being shipped to a downstream customer.
   (iii) For the Factory, an additional inventory cost of $0.50 for raw materials in transit from the unlimited production supply.
   (iv) Backorders represent lost sales and therefore cost double, or $1.00 for each unit in backorder.
   (v) Players can see both their weekly cost and total cost. In the example above, the wholesaler has 8 items in inventory, and 4 in shipping delay, for a total of 12. Thus, he is charged a total of $6.00 for the week.

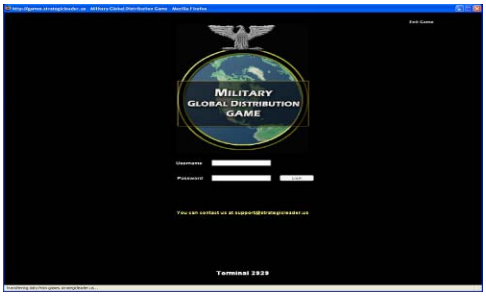
10) **Placing an Order.** The second step (for each player for each week) is to submit an order. Each player must decide how much to product to order. To help in this decision he has the following information available:
- Current inventory.
- Amount of product due in next week
- Most recent order (available by clicking the ***financial report*** button)
- Personal estimates / intuition
- Past demand history (available by clicking the ***financial report*** button)
- Upstream supplier's backorder.
- Other historical information in the financial report.

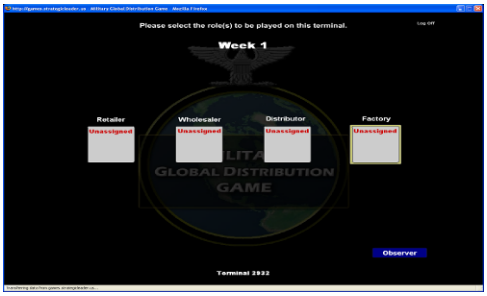
Once the player decides how much product to order, he enters that value in the ***Place Order*** box, and then clicks the ***Submit Order*** button. The player's weekly turn is now over. Once all players (or all 4 elements of the distribution chain) have completed their weekly turn, then a button will appear allowing the player to advance the game to the Next week.

[i] Because this game does not include any "profit," the ideal system cost would be in the case where every element in the distribution chain orders exactly the amount required to meet ultimate demand with no excess inventory or backorders. In this perfect system the only costs would be inventory costs during shipping. While this idea is probably never achievable, a rough estimate of a "perfect" system is the sum of all demands times 8 weeks of shipping delay/inventory cost of $0.50 per unit….so approximately $4 x total demand, with each component sharing approximately one fourth of that cost.

# Player Instructions

1) **Login.** To play the MGD Game, open a web browser and type in http://www.strategicleader.us . Select the Military Global Distribution Game icon and you will be directed to the screen on the left, below.

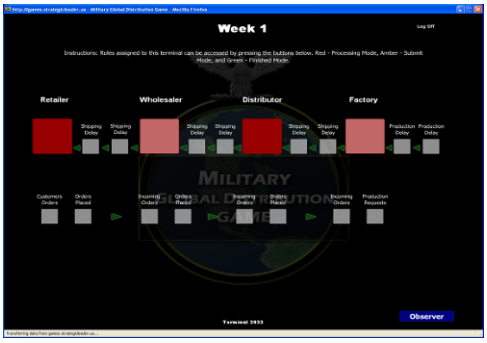



**A.** Each player should have a Username and Password from his/her instructor. Type them into the appropriate fields and hit Login. The player should then see the page on the right, above.

**B.** The player must click on the appropriate gray box to select a player role. The role should now change colors and read "Assigned to this Terminal". When all four roles have been assigned, a Join Game button will appear.


**C.** In the example to the right, the retailer and distributor roles are being played on one machine and labeled as "Assigned to this Terminal", while the wholesaler and factory roles are being played on a different machine and shown as "Assigned to Terminal 2933". The terminal numbers are assigned by the game server.[ii]




**D.** When all roles have been assigned, one of the roles on each computer the game is being played must select the Join Game button. If multiple roles are being played on one machine, then only one role must select Join Game. Next, the player will see to the screen on the left. Roles that appear in dark red show the roles which are being played on this computer. Roles that appear as light red are being played on a different computer.

2) **Player Instructions – Game Play.** The following screens will show the screens for the Distributor. All four roles perform the same actions, so we will not repeat these instructions for each role. From the previous screen, the player would click on the red block under the distributor name. Next he will see the current status of the current week. Shown on the right is an example of week 1 for the Distributor. As mentioned before, the game player has two steps for every turn: Process incoming orders, and Submit order to his supplier.


[ii] Note -- If more than one role is being played on a single machine, then each team must wait until the terminal is free before processing and inputting their orders for the week. This will prevent any one player (or player team) from seeing the status of other parts of the system.

# Player Instructions

**A. Process Incoming Orders.** Select ***Process Order***. The incoming orders will be filled entirely, if possible, and shipped to the wholesaler. The Delays will advance to the left as the order is processed. The second delay value will appear as a ? at this point as you won't know the value that has been shipped from the factory until after the game has advanced to the next week. The following picture shows the Distributor Screen after the order has been processed.


**B.** Because the incoming order was 0 and the backorder was also 0, the Distributor does not ship any units. The first "shipping delay" box on the screen to the right reflects this with a 0.

**C.** On hand inventory increased from 4 to 8 because 4 units arrived in from the factory.

**D.** Cost for this week for the Distributor then is $6.00. He has 8 units in inventory and 4 in shipping, so his cost for the week is 12 x $.50 = $6.00.

**E. Submit Order to Supplier.** Next, the player must decide how many items to order. Since this is the first week, there is no historical data to review in the Financial Report. In this example, because there are still 8 items in inventory, the Distributor believes that he has plenty of product for the time being and orders 0.


**F.** To finish the task he must type in the number and click ***Submit Order.*** Once an order is submitted, the player cannot go back to week 1. He can view data from week 1 by selecting the financial report box on his next turn.


**G. Await Next Turn.** After clicking the ***Submit Order*** button, the player is taken back to the role overview window to the right. Notice that the wholesaler block is now Green. It is dark green because the wholesaler has both processed incoming orders and submitted an order on the local machine. The block would appear yellow if incoming orders have been processed but no order submitted. All four roles must complete their turns before anyone can proceed to the next week.

**H. Advance to Next Week.** After clicking on the ***Proceed To Next Week*** button, the game will advance to Week 2 as shown on the right.


**End of Game.** The sequence of events described above is repeated for the length of the game. At the end of the defined game length point, an ***End of Game*** button will appear. Players will initially see a black screen without all of the historical "ground truth" information. This will allow player discussions based on their assumptions (…and before knowledge of the complete "ground truth").